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Title: Report Viewgraphs for IC project: Is high resolution or a more realistic bathymetry necessary to simulate Maud Rise polynyas in the Southern Ocean?

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Report Viewgraphs for IC project: Is high resolution or a more realistic bathymetry necessary to simulate Maud Rise polynyas in the Southern Ocean?

- Maud Rise and Weddell Sea polynyas in the Southern Ocean form because of a series of feedbacks between upper ocean high salinity anomalies, Taylor columns found near steep bathymetric features such the Maud Rise seamounts and the Astrid Ridge complex, and subsurface accumulation of ocean heat that can sustain ice openings once deep convection is triggered (see schematics in Figure 1).
- Questions remain on whether the polynyas can be simulated in Earth System Models that have the necessary high horizontal resolution and/or realistic bathymetry to be able to reproduce the above mentioned processes. Two coupled (atmosphere-ocean-seaice) E3SM-v1 experiments, featuring the same horizontal resolution, have been envisioned to investigate these issues: one that uses a more smoothed bathymetry (default) and one that uses a steeper, less smoothed bathymetry that follows the real topography more closely (Figure 2).
- Tests were performed to compile and run one of the above configurations on grizzly, using the E3SM version 1 model. Subsequent experiments will be carried our using the HiLAT Institutional Computing allocation.

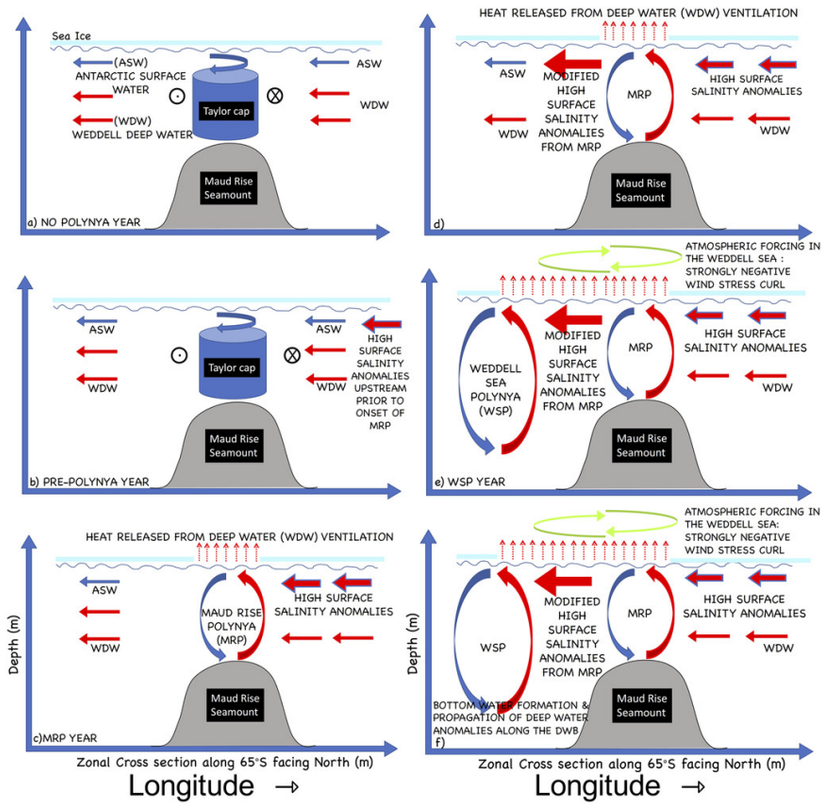

Figure 1: Schematic summarizing the formation processes of Maud Rise (left) and Weddell Sea polynyas (right).

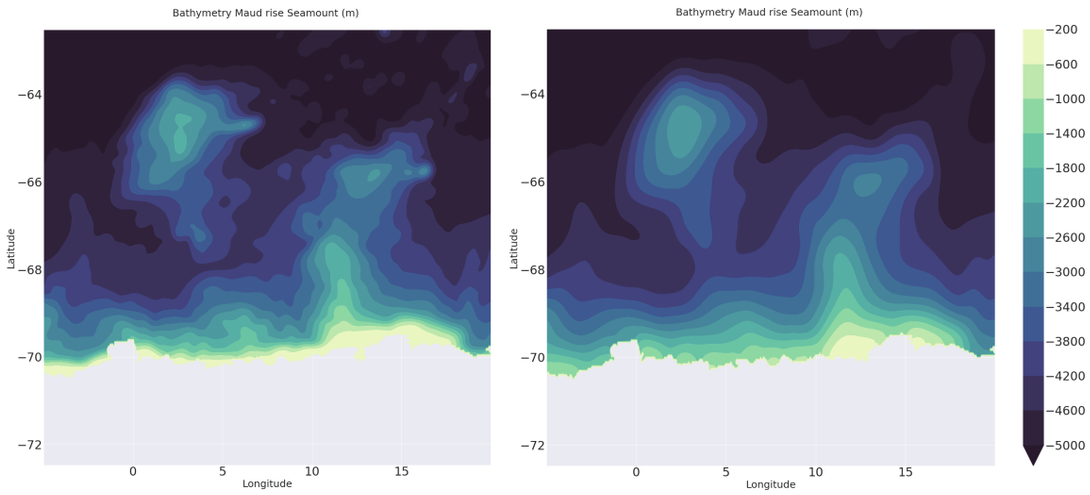

Figure 2: Bathymetry around the Maud Rise seamount for the less smoothed (left) and more smoothed case experiment (right).

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